

**FILED**

**MAY 21 2015**

Date: May 21, 2015

From: Ralph Nelms, Senior Reservoir Engineer, Whiting Petroleum Corporation

**SECRETARY, BOARD OF  
OIL, GAS & MINING**

RE: Moroni 11M-1107

"Gas to Wire" Detailed Site Specific Analysis  
Cost to Benefit Results

**Introduction:**

This report is a follow up to one of the questions asked by Mr. Gordon Moon regarding additional site specific economics for the "Gas to Wire" alternative to flaring at the April 22, 2015 DOGM hearing in Moab, Utah. At the current time the regulatory constraints established by Rocky Mountain Power would not allow the option of burning natural gas from the Moroni 11M-1107 well to generate electricity on site and place into the power grid east of the town of Moroni, Utah. Therefore this report represents a "feasibility scoping analysis" of what might be possible if regulatory constraints were removed at some future date. The overall energy conversion from gas to electricity is 28%.

**Discussion:**

At the request of Mr. Ralph Nelms a site specific analysis was prepared by the staff of Whiting's Oil and Gas Facilities group with input from Mr. William Herman, Facilities Engineering Supervisor CR/MC Operations and Mr. Roman Fedyk, Senior Facilities Engineer Operations. Table 1 summarizes the findings of the Moroni 11M-1107 site specific "Gas to Wire" economic analysis.

Table 1 shows the cash flow associated with three different production rates of natural gas from the Moroni 11M-1107 well at 100, 250 and 500 Mcfpd. The conversion from Mcfpd to BTU per hour is shown for the three natural gas production rates in the first part of Table 1 which is then converted to KW using the Flex Energy Micro MT250 turbine generator fuel to electricity conversion rate of 83 kW/MMBTU/hour.

The second part of Table 1 shows the number of MT250 generators required to burn the gas production volumes at three different rates and the cost to lease the number of turbine generators needed to burn the gas to generate electricity at a lease rate of \$23,000 per month per turbine generator. The third part of Table 1 shows the associated income from turbine generators electrical power sold at a wholesale price of \$0.02/KW theoretically placed into the Rocky Mountain Power grid.

The fourth part of Table 1 shows the net income associated with each gas production rate by subtracting the income at \$0.02/KW from the lease cost for the number of MT250 turbine generators required. As shown in Table 1 generating electricity from gas production of 100 Mcfpd would generate a monthly negative cash flow of -\$62,332, gas production of 250 Mcfpd would generate a monthly loss of -\$121,331, and gas production of 500 Mcfpd would generate a negative cash flow of -\$242,662.

In addition up front costs of \$200,000 for the interconnect to Rocky Mountain Power would be required plus an additional \$150,000 for the transformer and 60 hz synchronizer gear. Figure 1 shows pictures of a Capstone Flex Energy MT 250 Turbine used in the costs analysis. Figure 2 and 3 are articles discussing various applications of Micro Turbines generators in onshore and offshore oil and gas facilities.

**TABLE 1****Moroni 11M-1107 - Utah**

5/19/2015

**Electrical Energy Generation Analysis**

Power Generation - Micro Turbine producing 200kW at 5600' elevation

Data reference: Flex Energy MT250, conversion 83kW/MMBTU/hr

Wellington Flats - 1 well (min, norm, max) flow case

MSCFD	MSCFH	BTU/SCF	BTU/HR	KW
100	4	1321	5,502,158	457
250	10	1321	13,755,396	1,142
500	21	1321	27,510,791	2,283

**Cost**

Data reference: Flex Energy MT250, proposal Aug 19, 2013, \$763/day/unit

MSCFD	kW	# Turbines	Unit \$/mo	
			Rental	\$/mo cost
100	457	3	\$23,000	\$69,000
250	1,142	6	\$23,000	\$138,000
500	2,283	12	\$23,000	\$276,000

Cost Benefit, assuming fuel cost is \$0/SCF, electricity sales 2cents/kw-hr

MSCFD	kW	kW-hr/mo	\$/kw-hr	\$/mo gross
100	457	333,376	\$0.02	\$6,668
250	1,142	833,439	\$0.02	\$16,669
500	2,283	1,666,879	\$0.02	\$33,338

Net Gain, (Loss) from electricity sales

MSCFD	kW	\$/mo net
100	457	(\$62,332)
250	1,142	(\$121,331)
500	2,283	(\$242,662)


**Notes**

- 1 PacifiCorp (Rocky Mtn Power) estimated interconnect for 1MW at 12.47kV \$200,000 for distribution system upgrade to take capacity, metering and tap
- 2 Whiting borne installation costs for transformer, synchronizing gear and installation is estimated at \$150,000
- 3 This site would be net generator, therefore feed-in-tariff would apply, 2 cents/kw-hr is estimated, typical for non-renewable energy projects reference National Rural Electric Cooperative Assoc (NRECA), white paper, Feed-In-Tariffs

**FIGURE 1**



## FIGURE 2



Check out our latest videos!

CPST (NASDAQ) 0.52 | + 0.00 | May 21 2015 | 10:30

Home

Our Company

Products & Solutions

Investor Relations

In The News

Contact Us

In The News

Video Gallery

Press Releases

Media Events

Trade Shows

Recent Articles

Ad Campaign

Testimonials

Links

Turbine Talk

Press Releases

**Capstone Secures 1.4MW in Follow-On Orders for New Shale Compressor Stations**

CHATSWORTH, Calif., May 6, 2015 (GLOBE NEWSWIRE) -- Capstone Turbine Corporation ([www.capstoneturbine.com](http://www.capstoneturbine.com)) (Nasdaq:CPST), the world's leading clean technology manufacturer of microturbine energy systems, announced today that it recently received 1.4MW of orders from E-Finity Distributed Generation for microturbines to be used for oil and gas operations in the Marcellus and Utica Shale regions.

E-Finity Distributed Generation, Capstone's distributor for the Marcellus and Utica Shale plays, has secured multiple orders totaling 1.4MW of electric power. The orders came from one of their largest Capstone customers.

The shale customer is once again turning to Capstone and E-Finity to power two new compressor station facilities in the state of New York. A Capstone C800 Series product will power one station and the other will have a C800 Series product. Both sites will have a heat exchanger paired with their Capstone system. The combined heat and power systems will provide both primary electric power and a water heating source for buildings and facility fuel gas heating.

The customer chose Capstone's clean-and-green technology due to its continuous duty rating and the low emission and maintenance the turbines provide. The customer has also put their trust in the Capstone product by investing in Capstone's Factory Protection Plan, which will provide 24/7, year round maintenance for their turbines.

"It's great to see our Oil & Gas customers take advantage of our clean waste heat and cogeneration, increasing their overall efficiency. In fact, these sites have the ability to be upwards of 75% efficient," said Jeff Beiter, Managing Partner for E-Finity.

"Despite the precipitous drop in oil prices, shale gas production continues to expand just at a slower and more deliberate rate than a couple years ago," stated Darren Jamison, President and Chief Executive Officer at Capstone Turbine. "Shale gas producers are focused on increasing efficiency and lowering operating costs in response to the drop in energy prices. Follow-on orders like this certainly indicate that major oil and gas producers are continuing to select Capstone's efficient and low life cycle cost microturbines as their preferred option for their critical onsite power needs," added Jamison.

About Capstone Turbine Corporation


Capstone Turbine Corporation ([www.capstoneturbine.com](http://www.capstoneturbine.com)) (Nasdaq:CPST) is the world's leading producer of low-emission microturbine systems and was the first to market commercially viable microturbine energy products. Capstone Turbine has shipped approximately 8,000 Capstone Microturbine systems to customers worldwide. These award-winning systems have logged millions of documented runtime operating hours. Capstone Turbine is a member of the U.S. Environmental Protection Agency's Combined Heat and Power Partnership, which is committed to improving the efficiency of the nation's energy infrastructure and reducing emissions of pollutants and greenhouse gases. A UL-Certified ISO 9001:2008 and ISO 14001:2004 certified company, Capstone is headquartered in the Los Angeles area with sales and/or service centers in the New York Metro Area, United Kingdom, Mexico City, Shanghai and Singapore.

The Capstone Turbine Corporation logo is available at <http://www.globenewswire.com/newsroom/prs/?pkgid=6212>

This press release contains "forward-looking statements," as that term is used in the federal securities laws, about the growth of the oil and gas market and the advantages of our products. Forward-looking statements may be identified by words such as "expects," "objective," "intend," "targeted," "plan" and similar phrases. These forward-looking statements are subject to numerous assumptions, risks and uncertainties described in Capstone's filings with the Securities and Exchange Commission that may cause Capstone's actual results to be materially different from any future results expressed or implied in such statements. Capstone cautions readers not to place undue reliance on these forward-looking statements, which speak only as of the date of this release. Capstone undertakes no obligation, and specifically disclaims any obligation, to release any revisions to any forward-looking statements to reflect events or circumstances after the date of this release or to reflect the occurrence of unanticipated events.

"Capstone" and "Capstone MicroTurbine" are registered trademarks of Capstone Turbine Corporation. All other trademarks mentioned are the property of their respective owners.

CONTACT: Capstone Turbine Corporation  
Investor and investment media inquiries:  
818-407-3628  
[ir@capstoneturbine.com](mailto:ir@capstoneturbine.com)





**FIGURE 3**



Check out our latest videos!

CPST (NASDAQ) 0.52 | -0.00 | May 21 2015 | 10:

Search

Home

Our Company

Products & Solutions

Investor Relations

In The News

Contact Us

## Products & Solutions

Products

Solutions

Service

Global Case Studies

Technology Tour

## Solutions - Resource Recovery: Oil and Gas

### "Onsite Power, No Waste"

Capstone MicroTurbines reliably power onshore and offshore operations using unprocessed wellhead gas (economic or flare, sweet or up to 7% sour) to generate 3-phase, load-following continuous power.

#### OILFIELD & PLATFORM APPLICATIONS

Perfect for both manned and unmanned platforms, Capstone MicroTurbines can be fueled with unprocessed wellhead gas to provide continuous load following power down to an idle and up to a few hundred kilowatts in easily manageable, redundant 30 and 65kW models.

Capstone's offshore C30 and C65 models are UL Certified to meet Class 1, Division 2 NFPA 496. For non-hazardous-area placement, a more affordable stainless steel package is available for each model. Non-hazardous units are UL-certified to meet the new UL220 and UL1741 category for engine generators fueled with "raw natural gas."

Capstone MicroTurbines use no oil, lubricants, coolants, other hazardous materials, or even water. This eliminates transporting, storage, and costly hazmat spill/leakage issues associated with engine gensets.

You'll also find that a Capstone platform power solution dramatically reduces scheduled maintenance to mere filter changes twice a year. The first minor scheduled maintenance is at 20,000 hours, an overhaul is suggested by 40,000 hours.

That's the kind of rugged, low-cost, dependable, set-it-and-forget-it operation you need to maximize platform performance and minimize downtime risk.



#### ONSHORE UPSTREAM

At upstream sites where uneconomic gas is being flared, Capstone MicroTurbine power is a great fit. For unelectrified sites, it's the answer that can pay for itself the minute you start it up using flare or unprocessed economic site gas.

Like the offshore models, Capstone MicroTurbines deliver flexible, reliable, high-availability, redundant modular power when and where you need it. Our inland models, however, are very affordable.

#### GAS STORAGE/TRANSMISSION

In the US and abroad, Capstone MicroTurbines are helping ensure the flow of natural gas.

Since Capstone MicroTurbines have very high availability due to very brief, infrequent scheduled maintenance needs, they are proving a perfect fit for compression, transmission, and storage stations.

As noted in this article in *Distributed Energy* magazine, one of the largest natural gas transmission and storage corporations use Capstone MicroTurbines at several of their facilities. Among them, Dominion Transmission's Ithaca, New York, station relied on their Capstone MicroTurbines to keep the gas flowing when they lost power for more than a day during the August 2003 Great Northeastern Blackout.

In addition to C65 systems providing secure power 24/7, the C65-ICHP system can be used to heat water to raise the temperature of gas chilled by process pressure drops, as Dominion Transmission does at their Crayne compressor station in Pennsylvania.

- C30 Oil & Gas p/n 331034E
- C65 Oil & Gas p/n 331040G
- C200 Hazardous Location p/n 331060D



The Class I Division 2 Groups C, D MicroTurbine Engine Generators (C30 and C60/65) for Use in Hazardous Locations systems are certified by Underwriters Laboratories to NFPA 496. UL listed file Number E240758. This is equivalent to Class I Zone 2 Groups IIB, IIA.

#### Our Company

About Us  
Leadership  
Capstone's Value Proposition

#### Products & Solutions

Products  
Solutions  
Service

#### Investor Relations

Ask Management  
Stock Information  
SEC Filings

#### In The News

Video Gallery  
Press Releases  
Media Events

#### Contact Us

Contact Capstone Turbine